

CLAIMS

What is claimed is:

1. A fusion molecule comprising HDAg and at least one binding moiety.
2. The fusion molecule of Claim 1 wherein the binding moiety is selected from the group consisting of an antigen, an antibody, a single chain antibody, a ligand, a receptor, an enzyme, a ligand interaction peptide, a chemical, an effector, an oligonucleotide, a signal amplification peptide, an enhancer recognition protein, a promoter binding protein, a label, a growth factor, a cytokine, a nuclease, a small organic molecule, a test substance, a cytotoxic agent, a substrate, a solid substrate, a drug or a fragment thereof.
3. The fusion molecule of Claim 1 which comprises two binding moieties which are binding partners.
4. The fusion molecule of Claim 1 which is a fusion protein.
5. The fusion molecule of Claim 1 wherein the HDAg and the binding moiety are chemically linked.
6. The fusion molecule of Claim 1 wherein the HDAg and the binding moiety are expressed as a single unit.
7. A coiled-coil oligomer comprising at least two fusion molecules of Claim 1.
8. The coiled-coil oligomer of Claim 7 which is an octamer.

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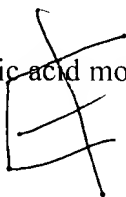
9. The coiled-coil oligomer of Claim 7 wherein two fusion molecules are the same.
10. The coiled-coil oligomer of Claim 7 wherein two fusion molecules are different.
11. An isolated nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of:
- a) a nucleotide sequence depicted in Figure 9, nucleotides 37 - 150 of Figure 9, nucleotides 37 - 186 of Figure 9, Figure 10, nucleotides 1421 - 1566 of Figure 10, nucleotides 1457 - 1566 of Figure 10, Figure 15 and Figure 16;
 - b) a complementary strand of the sequence of a);
 - c) DNA sequences that hybridize to the sequence of a) or b); and
 - d) RNA sequences transcribed from the sequences of a), b) or c), or a fragment or mutation thereof, which encodes a coiled-coil oligomer.
12. An isolated nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of:
- a) a nucleotide sequence encoding a polypeptide comprising an amino acid sequence depicted in a row of Figure 1, amino acids 12 - 48 of a row of Figure 1, the top row of Figure 3C, Figure 9, amino acids 12 - 48 of a row of Figure 9, Figure 10, amino acids 12 - 88 of Figure 10, Figure 11 and Figure 17;
 - b) the complementary strand of the sequence of a);
 - c) RNA sequences transcribed from the sequences of a) or b), or a fragment or mutation thereof, which encodes a coiled-coil oligomer.
13. An isolated nucleic acid molecule encoding a fusion molecule of Claim 1.

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14. A fusion gene comprising a nucleic acid molecule of Claim 11 operably linked to a nucleic acid molecule encoding a heterologous peptide.
15. A fusion gene comprising a nucleic acid molecule of Claim 12 operably linked to a nucleic acid molecule encoding a heterologous peptide.
- 5 16. A recombinant polypeptide comprising an amino acid sequence encoded by a nucleic acid molecule of Claim 11.
- 10 *Sub B30* 17. An isolated and purified molecule comprising a polypeptide having an amino acid sequence selected from the group consisting of an amino acid sequence depicted in a row of Figure 1, amino acids 12 - 48 of a row of Figure 1, amino acids 12 - 60 of a row of Figure 1, the top row of Figure 3C, Figure 9, amino acids 12 - 48 of Figure 9, amino acids 12 - 60 of Figure 9, Figure 10, Figure 11 and Figure 17, or a fragment or derivative thereof which forms a coiled-coil oligomer.
- sub E* 15 18. A derivative of an HDAG peptide wherein a serine residue is substituted with cysteine.
19. An isolated and purified molecule comprising a polypeptide comprising an amino acid sequence of amino acids 12 - 88 of HDAG, or a fragment or derivative thereof which forms a coiled-coil oligomer and nuclear localization signal.
- 20 20. A polypeptide encoded by a fusion gene of Claim 14.
21. A polypeptide encoded by a fusion gene of Claim 15.

22. A vector comprising a nucleic acid molecule which encodes a subunit of an HDAG coiled-coil octamer.
23. A vector comprising a nucleic acid molecule of Claim 11.
24. A vector comprising a nucleic acid molecule of Claim 12.
- 5 25. A vector comprising a nucleic acid molecule of Claim 13.
26. A vector comprising a nucleic acid molecule encoding a fusion molecule of Claim 1.
27. A vector comprising a nucleic acid molecule encoding HDAG and at least one multiple cloning site.
- 10 28. The vector of Claim 27 wherein at least one multiple cloning site is located 3' to the nucleic acid molecule encoding HDAG.
29. The vector of Claim 27 wherein at least one multiple coding site is located 5' to the nucleic acid molecule encoding HDAG.
30. The vector of Claim 27 wherein there are at least two multiple coding sites,
15 wherein at least one multiple coding site is located in a flanking region 3' to the nucleic acid molecule encoding HDAG and at least one multiple coding site is located in a flanking region 5' to the nucleic acid molecule encoding HDAG.
31. A vector comprising a nucleic acid molecule of Claim 11 and at least one multiple cloning site.

32. A vector comprising a nucleic acid molecule of Claim 12 and at least one multiple cloning site.
33. The vector of Claim 32 further comprising a nucleic acid molecule encoding a nuclear localization signal.
- 5 34. The vector for expression of the fusion molecule of Claim 1 wherein a first heterologous gene encodes a first binding moiety and a second heterologous gene encodes a second binding moiety.
35. A vector of Claim 27 which further comprises a nucleic acid molecule which encodes a heterologous gene.
- 10 36. A host cell which comprises a nucleic acid molecule which encodes a fusion molecule of Claim 1.
37. A host cell which comprises a nucleic acid molecule of Claim 11.
38. A host cell which comprises a nucleic acid molecule of Claim 12.
39. A method of manufacturing a host cell comprising a nucleic acid molecule
15 encoding a fusion molecule comprising HDAg and at least one binding moiety comprising introducing a vector of Claim 26 into the host cell.
40. A method of expressing a high valency display of at least one binding moiety comprising introducing into a cell a vector comprising a nucleic acid molecule encoding HDAg and a nucleic acid molecule encoding the binding moiety and

culturing the cell under conditions sufficient to permit expression of a fusion molecule comprising the binding moiety and HDAg.

41. A method of enhancing interaction between binding partners comprising contacting a fusion molecule of Claim 1 with a second binding moiety wherein the first and second moieties are binding partners.

42. A method of Claim 41 wherein the fusion molecule presents the first and second binding moieties.

43. The method of Claim 41 wherein the interaction between ligands occurs in solution, on membranes or on surfaces.

44. A method of Claim 41 wherein the fusion molecule is a subunit of a coiled-coil oligomer and the first and second moieties are bound to the oligomer.

45. The method of Claim 41 whereby fusion of a first cell and a second cell is enhanced.

46. A method for delivering molecules to a cell comprising contacting them with a fusion molecule of Claim 1.

47. The method of Claim 46 wherein the binding moiety is an oligonucleotide.

48. The method of Claim 46 wherein the oligonucleotide hybridizes to a nucleic acid molecule in the cell.

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49. The method of Claim 47 wherein said fusion molecule further comprises a double-stranded nuclease.
50. The method of Claim 46 wherein the fusion molecule comprises a first binding moiety and a second binding moiety wherein the first binding moiety interacts with a binding partner and the second binding moiety functions as an effector.
51. The method of Claim 50 wherein the first binding moiety interacts with a cell surface receptor and the second binding moiety can kill the cell.
52. A method of amplifying a signal in a solid phase assay comprising coupling an HDag octamer with at least one copy of a domain which interacts with a ligand and at least two copies of a label.
53. A method of Claim 52 wherein the label is selected from the group consisting of alkaline phosphatase, a radiolabel, streptadavin and green fluorescent protein.
54. The method of Claim 52 wherein the solid phase assay is an ELISA assay.
55. A method of facilitating exchange of substrates and products comprising coupling an HDag oligomer to at least two enzymes which function in a linked pathway.
56. A method of enhancing a reaction between binding partners comprising coupling the binding partners to an HDag oligomer.

57. A method of enhancing a reaction between two binding partners comprising coupling one binding partner to an HDAG oligomer and contacting the oligomer to a second binding partner.

$\text{Al} \text{C}^3 \}$

Variable	Mean	Standard deviation	Minimum	Maximum	Skewness	Kurtosis	Jarque-Bera	Probability
Return	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Volatility	0.0100	0.0050	0.0000	0.0200	0.0000	3.0000	0.2261	0.8888
Correlation	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Information ratio	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Tracking error	0.0100	0.0050	0.0000	0.0200	0.0000	3.0000	0.2261	0.8888
Alpha	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Beta	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Gamma	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Delta	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Epsilon	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Zeta	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Eta	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Theta	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Iota	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Kappa	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Lambda	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Mu	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Nu	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Xi	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Omicron	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Pi	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Rho	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Sigma	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Tau	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Upsilon	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Phi	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Chi	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Psi	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888
Omega	0.0000	0.0100	-0.0200	0.0200	0.0000	3.0000	0.2261	0.8888